Variability and uncertainty of intake fraction as a function of distance from source

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Published in:
Abstract book - The International Society of Exposure Science 24th Annual Meeting

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

ferromanganese refinery. Modeled Mn concentrations were compared to monitored Mn levels obtained from a centrally located stationary air sampler that collected air samples in 48 hour intervals three times per week. The Index of Agreement for modeled versus monitored data was 0.34 (48 hour levels), and 0.78 (monthly levels). Fractional Bias for 48 hour levels was 0.02 and for monthly levels was -0.02. Given the overall agreement of modeled to monitored levels, the use of modeled Mn concentrations as exposure values for study subjects is a viable and cost effective alternative to personal air monitoring.

Keywords: A-exposure models, B-metals, D-children

We-P-34

Comparison of Chemical and Microbial Contaminants in Tap and Bottled Water in a U.S.-Mexico Border Community

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Abstract: Bottled-water use is steadily increasing in the United States because of increased advertising by bottled-water purveyors and fear that municipal tap water might be contaminated. In Nogales, Arizona, some water purveyors have received drinking-water violations, but it is not clear whether local tap and bottled water differ in quality. The purpose of this study was to assess possible significant differences in the quality of municipal tap water and bottled water in Nogales. Water samples were collected from thirty homes and assayed for chemical and microbial contaminants regulated by the U.S. Environmental Protection Agency. Bottled water included small (0.5 L) and large (3.8 L), individually sealed water bottles as well as water purchased in reusable containers from self-service vending machines or from water stores. There were no significant differences in the concentration of chemical contaminants between tap and bottled water. Fecal coliforms were confirmed in 2/30 of tap- and 16/30 of bottled-water samples. Bottled water stored in reusable large containers (n=17) had the highest concentration of fecal coliforms, which were detected in 14 samples. Families who reported cleaning large reusable water containers with soap or hot water had significantly lower fecal coliforms (p=0.003) in their drinking water than those who rinsed with only water. Water samples collected directly from stores and sealed bottles contained no detectable coliforms, with the exception of one sample collected directly from a vending machine. Results suggest that secondary contamination in the home might contribute to higher levels of coliforms in water stored in reusable containers. These results are from grab samples and additional samples would be needed to understand fluctuations over time. Interventions can be implemented to educate families on keeping reusable water containers clean and on the quality of local tap water.

Keywords: D-community, A-environmental regulation, C-water, B-microbial agents, A-sampling methods

We-P-35

Variability and Uncertainty of Intake Fraction as a function of Distance from Source

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Abstract: The intake fraction (iF) is now a commonly used metric to assess exposure of outdoor emissions. It is therefore important to assess the variability of this metric and its sensitivity to both spatial and non-spatial parameters. We developed Pangea, a flexible, spatial, multi-scale, multimedia, fate and exposure model, which allows computing the spatial distribution of iF associated with emissions of pollutants. An important output of this model is the variation of iF as a function of distance from source (radial summary). We performed studies assessing the variability of iF based on Monte-Carlo analysis (MC) for non-spatial parameters, the influence of the model grids resolution, and the variability of iF for multiple sources (e.g. 117 solid waste incinerators throughout the USA). We present MC for 80 non-spatial parameters (physic-chemical parameters involved in parameterizing all media and transfers, BAFs, etc), for an emission of 6 relevant pollutants, located in the North-East of France. Results show the percentage of global iF which happens locally (50km radius around source). They show in particular that only 3-8% of the intake of Benzene through inhalation happens within local radius, and that 75-99% of the intake of B[a]P through ingestion happens within the same radius. Uncertainty on the fraction of intake that is local is much higher for TCDD and PM2.5 which have intermediary transport distances. Variations in iF between source locations are substantially higher for “local” substances (more than 2 orders of magnitude for B[a]P) than for the longer range chemicals (less than an order of magnitude for Benzene). These

studies show moreover that the approach implemented in Pangea, which decouples spatial model parameterization (GIS, a few hours per spatial configuration) and non-spatial parameterization (MATLAB, a few seconds/minutes per run), is essential for having enough flexibility to implement uncertainty analysis.

Keywords: A-exposure models, C-multimedia, A-geospatial analysis/GIS, multi-scale, uncertainty, multi-scale, uncertainty

We-P-36
Aircraft Measurements of Gaseous Pollutants and Particles in Beijing: Classification and Distribution
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Abstract: Measurements of gaseous pollutants, including ozone (O3), Sulfur dioxide (SO2), nitrogen oxides (NOX = NO + NO2), carbon monoxide (CO), particle concentration (5.6-560 nm and 0.47-30 μm), and related meteorological information (T, RH, P) were conducted in Beijing and Surrounding Region during Aug. 27-Oct. 13 in 2008. Total 18 flights (70 h flight time) from the surface to 2100 m were obtained with a Yun-12 aircraft with a cruising speed of about 180 km h-1 during the latitude range of 38 N-40 N and longitude range of 114 E-118 E, the southern surrounded area of Beijing city. This measurement was to characterize the regional variation of air pollution during and after the Olympics of 2008, the impacts of different transport direction and possible influencing factors. Results suggested that four different groups of transport sources influenced the pollution level of pollutants with the consideration of the backward trajectory analysis, including: (1) the pollutant transport of the southern direction with higher pollutants level; (2) the cleaner long-range transport of the northern or northwestern direction with lower pollutants level; (3) the transport from the eastern direction with characteristics of sea sources, i.e. middle level of gases pollutants and higher particle concentration; (4) the transport of mixing directions, i.e. lower altitudes from the pollutant transport direction or local pollution but higher altitudes from the clean transport direction.

Keywords: C-air, B-particulate matter

We-P-37
Variation of Secondary Inorganic Ions During the Multi-day Heavy Pollution Episodes in January, 2013 in Beijing, China
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Abstract: The city of Beijing and surrounding area is one of the important city agglomerations in China, accounting for 10.9% of national GDP and 7.8% of national population in 2010. As a result of economic development, the structures of air pollution sources and fuel consumption have constantly been changing. Owing to direct emissions from motor vehicles and secondary formation by photochemical reaction, the great increase of sulfate, nitrate, ammonium, and chlorine of PM2.5 during heavy pollution episodes were shown special concern due to its significant positive associations with cardiovascular, or respiratory mortality, as more polluted and hazy days have appeared more and become increasingly conspicuous in Beijing. The multi-day heavy pollution episodes occurred in January, 2013 in Beijing, China, and the chemical species of water soluble inorganic ions were measured during the multi-day heavy pollution episodes. Total 8 ions with 1-hour time resolution of data were analyzed with online monitoring and analysis system for particulate and gaseous ions(URG 9000 series) on the roof of a third-floor building in Chinese Academy of Environmental Sciences. Results showed that sulfate, nitrate, chloride and PAN were observed peak values on 10th-11th, 13th-14th, 23rd-24th and 29th-30th, indicating consistency variation with PM2.5 concentrations. For the cations, only K+ showed accordance with anions. The peak of NH4+ was observed only in 13th-14th, indicating different sources and different forming mechanisms during different heavy pollution episodes. Ca2+ and Mg2+ decreased sharply in the end of January, indicating the strong cleaning effects from northwestern transport direction. The decay of anions showed the contribution of carbonate or organic anions in Beijing, by the calculation of equivalent ratio between cations and anions.

Keywords: B-particulate matter, C-air, Sulfate, Nitrate, Ammonium